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Memo

date: *Jan. 16, 2001*

to: *N. Gmur*

from: *C. Weilandics* C. Weilandics

subject: *Bldg. 725 RF Equipment Survey*

On Jan. 12, 2001, a partial RF survey was conducted by myself in Bldg. 725. In attendance was R. D' Alsace of the NSLS RF group. The purpose was to get a general overview of the status of potential for exposures to RF in Bldg. 725 from the high power RF equipment in use. Measurements were made on the following equipment:

1. Booster RF power amplifiers, idle and ramping, 52.8 MHz
2. VUV RF power amplifiers, powered, 211 MHz, stored beam
3. X-ray ring RF power amplifiers, 52.8 MHz, stored beam
   a) 100 watt amplifiers
   b) 3 kW power amplifiers
   c) 125 kW power amplifiers

Electric (E) field surveys were conducted. Surveys were conducted using a calibrated (Mar. 9, 2000) Holaday HI-3002 broadband exposure meter. The E field probe used was capable of measuring RF over the frequency ranges of 0.5 MHz to 6000 MHz. The minimum resolution on the instrument was 0.13 mW/cm^2. Measurements were taken around the cabinets housing the equipment, specifically at the panel joints where one might expect some leakage. Also surveyed were the accessible portions of the RF cables and their connections, and waveguide connection points and joints. Measurements were essentially at "contact", or as close the areas as the probe head cover would allow. The 10 cm diameter styrofoam probe head cover actually allows access no closer than about 4-5 cm.

Results

In general, we found no measurable RF from any of the systems with three exceptions. On the system XRF1 125 kW amplifier, at approximately the seven and nine o'clock positions of the main front panel, we were able to measure about 0.13 mW/cm^2, or about 13% of the standard. The level dropped off so as to be unmeasurable when the probe head was moved away one to two inches. The only other location where a measurable level could be seen was about 0.2 mW/cm^2, or about 20% of the standard at "contact" on a waveguide coupling in back of the XRF4 125 kW system cabinet. This again was highly localized. The three measurement points are indicated in Figures 1 and 2 with gray filled circles.

Discussion

The standard for exposure to non-ionizing radiation, which BNL has referenced, is the IEEE C95.1-1991 standard also referenced by ACGIH. In all cases the electric field strength levels measured were well below the standard of 1 mW/cm^2. In ACGIH's notice of intended changes, induced and contact body current measurements are to be made if the electric field strength levels are above 18% (for the 52.8 and 211 MHz frequencies) of the TLV. In our case this was not exceeded except for the measurement made at the back of the XRF4 125 kW system cabinet, which was at 20 %. However, as stated above, these levels do not pose whole body exposures, and in no case was the Threshold Limit Value exceeded. The general TLVs for RF and microwaves are not expected to change. This survey documents a preliminary survey for systems at Bldg. 725. Based on this preliminary set of measurements, measured magnetic (H) fields are not expected to be significant, or in most cases measurable. Nevertheless these surveys should be made and can be provided when time becomes available.

IH99SR.01

cc: A. Ackerman
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R. Biscardi
R. D'Alsace
J. Peters

Table I: RF systems measured and conditions of measurement

Number	System Name	Power Rating	Fwd. Pwr.	Rev. Pwr.	Cavity Fld.	Notes
1	XRF1	125 kW	72 kW	7 kW	33.5 kW	240-248mA, 2.8 Gev
2	XRF1	3 kW	3 kW			240-248mA, 2.8 Gev
3	XRF1	100 W	70 W			240-248mA, 2.8 Gev
4	XRF2A	125 kW	66 kW	1 kW	45 kW	240-248mA, 2.8 Gev
5	XRF2A	3 kW	1.5 kW			240-248mA, 2.8 Gev
6	XRF2A	100 W	40 W			240-248mA, 2.8 Gev
7	XRF2B	125 kW	64 kW	1 kW	45 kW	240-248mA, 2.8 Gev
8	XRF2B	3 kW	1.5 kW			240-248mA, 2.8 Gev
9	XRF2B	100 W	40 W			240-248mA, 2.8 Gev
10	XRF3	125 kW	79 kW	8 kW	37 kW	240-248mA, 2.8 Gev
11	XRF3	3 kW	2 kW est.			240-248mA, 2.8 Gev
12	XRF3	100 W	50 W			240-248mA, 2.8 Gev
13	XRF4	125 kW	79 kW	8 kW	37 kW	240-248mA, 2.8 Gev
14	XRF4	3 kW	2 kW (est.)			240-248mA, 2.8 Gev
15	XRF4	100 W	50 W (est.)			240-248mA, 2.8 Gev
16	VUVRF1	50 kW	8 kW	2 kW	3 kW	67 mA, 800MeV
17	VUVRF1	3 kW	200 W			67 mA, 800MeV
18	VUVRF1	100 W	5 W			67 mA, 800MeV
19	VUVRF2	10 kW	590 W	20 W	630 W	67 mA, 800MeV
20	VUVRF2	10 W	1W			67 mA, 800MeV
21	Booster RF	3 kW				"Front porch"
22	Booster RF	3 kW				Ramping
23	Booster RF	100 W				"Front porch"
24	Booster RF	100 W				Ramping

Figure 1: XRF1 125 kW amplifier

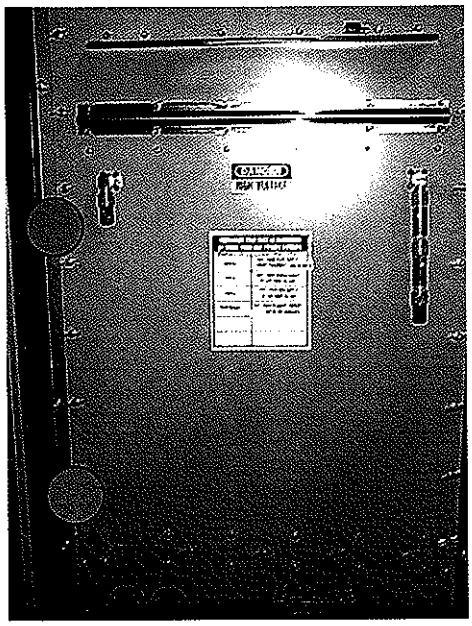
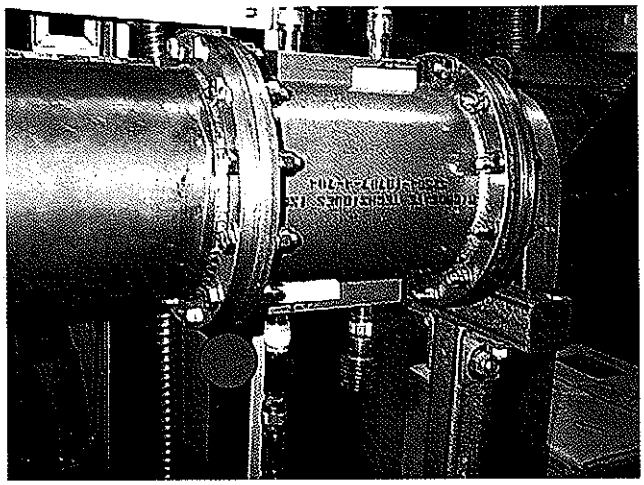


Figure 2: XRF4 125 kW system waveguide coupling



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